

NON-PUBLIC?: N
ACCESSION #: 8712150140

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Millstone Nuclear Power Station Unit 2 PAGE: 1 of 5

DOCKET NUMBER: 05000336

TITLE: Reactor Trip on Low #1 Steam Generator Level, Failure of #1 Feed
Regulating Valve Positioner

EVENT DATE: 11/16/87 LER #: 87-012-00 REPORT DATE: 12/11/87

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Edwin R. Foster, Engineering Specialist TELEPHONE #: 203-447-1791

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: SJ COMPONENT: 84 MANUFACTURER: M430

REPORTABLE TO NPRDS: Y

CAUSE: X SYSTEM: BA COMPONENT: 33 MANUFACTURER: G080

REPORTABLE TO NPRDS: Y

CAUSE: X SYSTEM: EA COMPONENT: 52 MANUFACTURER: G080

REPORTABLE TO NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: While operating at 100% power on November 16, 1987 at 0211 the Unit experienced an automatic reactor trip due to a low steam generator level in the #1 Steam Generator. Following turbine valve testing, the operator responded to an indicated high level in #1 Steam Generator by taking manual control of the #1 Feedwater Regulating Valve. The valve failed to respond to all manual closed signals until a high steam generator level initiated a ramp closing signal, closing the valve. This resulted in a low steam generator level and subsequent reactor trip before ramp override could be initiated. All safety systems responded normally with the exception that the 'A' Auxiliary Feed Pump (AFP) failed to start on the Auto Auxiliary Feed actuation signal and was started manually. The 'spring-return-to-normal', 'A' Auto Auxiliary Feed Override Switch was in an intermediate position, preventing the start. Other events subsequent to the reactor trip included the loss of the A and C Reactor

Coolant Pumps (RCPs) when the 25A (6.9KV) bus failed to transfer from the Normal Station Service Transformer to the Reserve Station Service Transformer. This was caused by a damaged component preventing full racking in of the breaker. The breaker was re-racked and the RCPs restarted. A higher than normal post trip cooldown was contributed to by manual operation of a steam supply valve to a Moisture Separator Reheater (MSR) pending repair to the valve stem. Following Main Steam Isolation Valve closure to arrest the cooldown, the MSR supply valve was manually closed. Appropriate repairs and testing were performed and the turbine was placed on line in 26 hours and 5 minutes.

(End of Abstract)

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I. Description of Event

While operating at 100% power on November 16, 1987 at 0211, the Unit experienced an automatic reactor trip due to low steam generator level in the #1 Steam Generator. Approximately ten minutes after the completion of weekly stop and intercept valve testing, where steam generator level oscillations are normally expected, a high steam generator level setpoint deviation alarm was received and a high steam generator level in #1 Steam Generator was indicated. The #1 Feed Regulating Valve failed to respond to all closing signals when the operator placed it in manual control in an effort to restore level. The valve, however, did respond to a high steam generator level initiated ramp closed signal. Before the operator could reset the ramp signal, a low #1 Steam Generator level and subsequent reactor trip on Reactor Protection channels A and C, low steam generator level occurred. The licensed operators initiated Emergency Operating Procedures EOP 2525, "Standard Post Trip Actions" and EOP 2526, "Reactor Trip Recovery".

All safety systems responded normally to the trip. Subsequent to the trip, however, the 'A' Auxiliary Feed Pump failed to start on the Automatic Auxiliary Feedwater actuation signal. Auto Auxiliary Feedwater is initiated when Steam Generator level decreases below 12%, after a time delay of 3 minutes and 25 seconds. Auxiliary Feedwater was not required during this event because Main Feedwater was being supplied by the 'A' Steam Generator Feed Pump restoring Steam Generator level prior to MSIV closure.

Other related events subsequent to the reactor trip included the turbine

trip induced fast transfer of the Normal Station Service Transformer (NSST) loads to the Reserve Station Service Transformer (RSST). The 25A, 6.9KV, bus failed to transfer to the RSST resulting in the loss of the A and C Reactor Coolant Pumps (RCPs). Following an unsuccessful attempt to close the 25A breaker from the RSST, the breaker was racked down, returned to normal position and successfully closed. The A and C RCPs were then restarted. The 6.9KV bus is not safety related. The remaining two RCPs provided sufficient cooling flow in post trip recovery.

The plant also experienced a cooldown following the reactor trip, initially attributed to the loss of the two RCPs and the rapid steam generator level recovery. However, after restarting the two RCPs, plant cooldown continued. With all four RCPs running, reactor coolant average temperature (Tave) continued to drop to 500 degrees Fahrenheit at which time the operators secured the C RCP, due to Technical Specification requirements, and closed the main steam isolation valves, arresting the cooldown at 485 degrees Fahrenheit Tave.

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II. Cause of Event

The root cause of this event was the failure of the #1 Feedwater Regulating Valve, 2-FW-51A, to respond to closing signals from the control board in the automatic or manual modes. This resulted in the inability to recover from expected steam generator level oscillations, i.e., a high level in #1 Steam Generator. Following the reactor trip, and subsequent turbine trip, functional testing of the feedwater regulating valve using simulated signals showed the valve to be responding normally. Automatic and manual operation of the valve under no flow, no differential pressure conditions from the control panel indicated normal operation with no binding. A visual and mechanical inspection at the valve indicated no mechanical problems with the valve or actuator. With all other failure possibilities eliminated the valve positioner was replaced, followed by setup and stroke testing with the new positioner.

The 'A' Auxiliary Feed Pump failure to start was determined to be caused by the control panel 'reset/override' switch. Although the switch appeared to be in the 'start' position, this 'spring-return-to-normal' switch was found in an intermediate position, between contacts, preventing a start permissive signal. This mid-position of the switch was not readily apparent to the operator due to the switch's round, unmarked handle. Subsequent to finding the switch out of position,

the condition could not be duplicated, however the switch handle was replaced with the arrowed, pistol grip type to permit operator observance of a recurrence.

The 25A bus (6.9KV) failure to transfer to the RSST was caused by breaker's 22S2-25A-2 (H103) inability to be electrically closed. The closing failure was due to a bent shaft on the racking mechanism stop shaft device (shock absorber). This prevented the breaker from being fully racked in. Additionally an interlock switch (52/IS) failure in this breaker allowed the breaker spring charging motor to operate, giving the operator indication that the breaker was fully racked in. Both deficiencies were corrected and the breaker tested.

Subsequent to the recovery from the cooldown by closure of the main steam isolation valves, an investigation showed the main steam supply to the 'B' second stage moisture separator reheater (MSR), 2-MS-2B, was in the manual mode (and caution tagged) due to stem binding experienced in the automatic mode. The downstream low load steam supply valve, 2-MS-79B, was operated in the manual mode during the previous startup per operating procedure, and remained in manual after reaching full steam load to the MSR. Following the trip both valves remained open, providing a steam path to the condenser, thereby contributing to the cooldown.

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III. Analysis of Event

This event is being reported pursuant to the requirements of paragraph 50.73(a)(2)(iv) due to the automatic trip on low steam generator level. There were no safety consequences of this event since safety systems functioned to restore the Unit to a stable condition and standard post trip operating procedures were followed. The 'A' Auxiliary Feed Pump was not required for Steam Generator level recovery as Main Feedwater remained on line. The remaining two RCPs provided sufficient cooling flow in post trip recovery, however, the A and C RCPs were available to be restarted in 1 hour and 8 minutes. Following repairs and testing the Main Turbine was placed on line in 26 hours and 5 minutes. The Unit returned to 100% power in 57 hours and 44 minutes.

IV. Corrective Action

Corrective action for the #1 Feedwater Regulating Valve, 2-FW-51A, failure to respond to closing signals from the control board, in the manual mode, was the replacement of the valve positioner. This was followed by setup and stroke testing of the valve both locally, and

from the control panel.

Following several unsuccessful attempts to duplicate the intermediate position that the 'A' Auxiliary Feed Pump 'reset/override' switch was found in following the trip, both the 'A' and 'B' Auto Auxiliary Feedwater Pump 'reset/override' switch round, unmarked handles were replaced by the pistol grip type with arrow indicators. The pistol grip handles will permit operator observance should this condition recur.

The 25A, 6.9KV, breaker, 22S2-25A-2 (H103) inability to be electrically closed was corrected by the replacement of the bent shaft on the racking mechanism stop shaft device and both single pole switches comprising the 52/IS breaker closing circuit interlock switch. The breaker was returned to service following successful load transfer testing. Additionally all 6.9KV and 4.16KV breaker cubicles were inspected for bent shaft stop devices. None were found.

The excessive plant cooldown following the trip was caused by the steam path to the condenser created by the manual mode operation of both 2-MS-2B, steam supply to the 'B' second stage MSR, and 2-MS-79B, low load steam supply to the 'B' second stage MSR. Either of these valves, operating in the normal automatic mode would have isolated this cooldown source. Upstream valve 2-MS-2B, was operated in manual under a caution tag and was scheduled to be repaired during the next refuel outage. Until this valve is repaired, downstream valve 2-MS-79B, will be operated in automatic except during startup, when it will be operated locally by plant operations.

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V. Additional Information

The Main Feedwater Regulating Valve, 2-RW-51A, is a Copes-Vulcan 12" 900# angle style valve assembly with a P-200-12 operator. The positioner is a Moore Products Co. Model 74G.
EIIIS Code SJ, Component Code 84.

The Auxiliary Feed Pump control panel 'reset/override' switches are General Electric SV-1 Control Switches, Model 16B1B20X2.
EIIIS Code BA, Component Code 33.

Reserve Station Service Transformer Breaker 22S2-25A-2 (H103) is a General Electric Type AM-7.2-500-64 with an operating mechanism Type ML-13.
EIIIS Code EA, Component Code 52.

The Main Steam to 'B' second stage MSR, 2-MS-2B, is a Powell 10" 600# gate valve with a Limitorque Operator.
EHS Code SB, Component Code ISV.

The Low Load Main Steam to 'B' second stage MSR, 2-MS-79B, is a Powell 10" 600# gate valve with a Limitorque operator.
EHS Code SB, Component Code ISV.

Similar LERs: 87-002, 87-009, 87-011.

ATTACHMENT # 1 TO ANO # 8712150140 PAGE: 1 of 1

NORTHEAST UTILITIES General Offices . Selden Street, Berlin, Connecticut
THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY P.O. BOX 270
HOLYOKE WATER POWER COMPANY HARTFORD, CONNECTICUT 06141-0270
NORTHEAST UTILITIES SERVICE COMPANY (203) 665-5000
NORTHEAST NUCLEAR ENERGY COMPANY
December 11, 1987
MP-11229
Re: 10CFR50.73(a)(2)(iv)

U. S. Nuclear Regulatory Commission
Document Control Desk

Washington, D. C. 20555

Reference: Facility Operating License No. DPR-65
Docket No. 50-336
Licensee Event Report 87-012-00

Gentlemen:

This letter forwards the Licensee Event Report 87-012-00 required to be submitted within thirty days pursuant to paragraph 50.73(a)(2)(iv).

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

/s/ Stephen E. Scace
Stephen E. Scace
Station Superintendent
Millstone Nuclear Power Station

SES/ERF:cjh

Attachment: LER 87-012-00

cc: W. T. Russell, Region I
W. J. Raymond, Senior Resident Inspector

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